CLAIMS

What is claimed is:

1. A method for the detection of phosphoglucose isomerase, ketol-isomerase and acetyltransferase activities in a sample, comprising the steps of:

a) providing:

i) a sample suspected to contain phosphoglucose isomerase, ketol-isomerase and acetyltransferase activities,

ii) glucose-6-phosphate,

iii) glutamine,

iv) acetyl coenzyme A, and

v) 5,5'-dithiobis(2-nitrobenzoic acid);

b) combining said sample, said glucose-6-phosphate, said glutamine, and said acetyl coenzyme A under conditions to yield reaction products comprising coenzyme A and N-acetylglucosamine-6-phosphate;

c) inactivating said phosphoglucose isomerase, ketol-isomerase and acetyltransferase activities; and

d) combining said reaction product comprising coenzyme A and 5,5'-dithiobis(2-nitrobenzoic acid) under conditions to yield a chromogenic reaction product comprising 2-nitro-thiobezoate anion, wherein said chromogenic reaction product is indicative of phosphoglucose isomerase, ketol-isomerase and acetyltransferase activities

2. The method of Claim 1, wherein said sample comprises a lysate selected from the group consisting of crude cell lysates and gel filtered cell lysates.

3. The method of Claim 2, wherein said lysate is a fungal cell lysate selected from the group consisting of *Aspergillus* cell lysates, *Candida* cell lysates, *Cryptococcus* cell lysates, *Histoplasma* cell lysates, *Pneumocystis* cell lysates, *Rhizopus* cell lysates, *Saccharomyces* cell lysates, and *Schizosaccharomyces* cell lysates.

4. The method of Claim 1, wherein said sample comprises purified fungal enzymes selected from the group consisting of phosphoglucose isomerases, ketol-isomerases and acetyltransferases.

5. The method of Claim 1, wherein said sample comprises recombinant fungal enzymes selected from the group consisting of phosphoglucose isomerases, ketol-isomerases and acetyltransferases.

6. A method for the detection of a compound having the ability to inhibit phosphoglucose isomerase, ketol-isomerase and/or acetyltransferase activities in a sample, comprising the steps of:

a) providing:

i) a sample suspected to contain phosphoglucose isomerase, ketol-isomerase and acetyltransferase activities,

ii) glucose-6-phosphate,

iii) glutamine,

iv) acetyl coenzyme A,

v) 5,5'-dithiobis(2-nitrobenzoic acid), and

vi) a candidate compound;

b) preparing a first and second reaction mixture, wherein said first reaction mixture comprises said sample, said glucose-6-phosphate, said glutamine, and said acetyl coenzyme A, and wherein said second reaction mixture comprises said sample, said glucose-6-phosphate, said glutamine, said acetyl coenzyme A and said candidate compound;

c) incubating said first and second reaction mixtures under conditions to yield reaction products comprising coenzyme A and N-acetylglucosamine-6-phosphate;

d) inactivating said phosphoglucose isomerase, ketol-isomerase and acetyltransferase activities;

e) combining said first and second reaction mixtures with said 5,5'-dithiobis(2-nitrobenzoic acid) under conditions to yield a chromogenic reaction product comprising 2-nitro-thiobezoate anion; and

f) comparing the quantity of said chromogenic reaction product in said first and second reaction mixtures.

7. The method of Claim 6, further comprising step g) scoring said candidate compounds as positive for the ability to inhibit phosphoglucose isomerase, ketol-isomerase and/or acetyltransferase activities in a sample, when said second reaction mixture yields less than 50% of said chromogenic reaction product than said first reaction mixture.

8. The method of Claim 6, wherein said sample comprises a lysate selected from the group consisting of crude cell lysates and gel filtered cell lysates.

9. The method of Claim 8, wherein said lysate is a fungal cell lysate selected from the group consisting of *Aspergillus* cell lysates, *Candida* cell lysates, *Cryptococcus* cell lysates, *Histoplasma* cell lysates, *Pneumocystis* cell lysates, *Rhizopus* cell lysates, *Saccharomyces* cell lysates, and *Schizosaccharomyces* cell lysates.

10. The method of Claim 6, wherein said sample comprises purified fungal enzymes selected from the group consisting of phosphoglucose isomerases, ketol-isomerases and acetyltransferases.

11. The method of Claim 6, wherein said sample comprises recombinant fungal enzymes selected from the group consisting of phosphoglucose isomerases, ketol-isomerases and acetyltransferases.

12. The method of Claim 6, wherein said candidate compound is present in an extract selected from the group consisting of extremophile extracts, marine macroorganism extracts, cyanobacterial extracts and algal extracts.

13. The composition comprising at least one candidate compound scored as positive by the method of Claim 7.

14. The composition comprising at least one candidate compound scored as positive by the method of Claim 7, wherein said candidate compound is present in an extract selected from the group consisting of extremophile extracts, marine macroorganism extracts, cyanobacterial extracts and algal extracts.

15. The composition comprising at least one candidate compound scored as positive by the method of Claim 7, wherein said candidate compound is present in a high performance liquid chromatography (HPLC) fraction of a microbial extract.

16. The composition comprising at least one candidate compound scored as positive by the method of Claim 7, wherein said candidate compound further has antifungal activity.

17. The composition of Claim 16, wherein said antifungal activity is determined by a test selected from the group consisting of agar diffusion assays, broth dilution assays, and animal model assays.

18. The composition of Claim 16, wherein said antifungal activity is selected from the group consisting of anti-*Aspergillus* activity, anti-*Candida* activity, anti-*Cryptococcus* activity, anti-*Histoplasma* activity, anti-*Pneumocystis* activity, anti-*Rhizopus* activity, anti-*Saccharomyces* activity, and anti-*Schizosaccharomyces* activity.

19. The composition of Claim 16, wherein said candidate compound further has mild toxicity to mammalian cells.

20. The composition of Claim 19, wherein said mammalian cells are selected from the group consisting of murine cells and human cells.

21. The composition of Claim 19, wherein said limited toxicity is determined by a test selected from the group consisting of *in vitro* and *in vivo* acute toxicity tests.